G.K. GILBERT AWARD

Presented to
Carle M. Pieters

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Brown University

Citation by James W. Head, III

Professor Carle Pieters is a pioneer in the field of planetary remote sensing and has made innumerable contributions to planetary spectroscopy, mineralogy, and geoscience. We are here today to recognize not only her contributions to planetary geoscience but also to celebrate her leadership in the international space community, her originality and enthusiasm, and her tenacious and generous spirit.

Carle Pieters' accomplishments are exemplified by research and professional activities in several key areas. Her laboratory spectroscopy experiments at Brown University have measured and modeled the interaction of visible to mid-infrared radiation with geologic materials, including analyses of U.S. and Soviet lunar samples, lunar meteorites, Mars analogs and meteorites, and terrestrial materials. Her investigations provide a basis for understanding the fundamental principles of mineral detection and identification, photometric effects, grain size and shape influences, band strengths, mineral mixtures, and modal abundances. She has tirelessly encouraged and assisted others in obtaining quantitative information that can be used to analyze and interpret the data.

One of her passions is the remote compositional analysis of the Moon. Beginning with characterizing the diversity of mare basalt types, she showed the non-representativeness of the Luna and Apollo sample return sites and the implications of the full suite of basalt types. Using impact craters as probes of the highland crust in space and time, her early work revealed the presence of olivine in the central peaks of Copernicus. With Stefanie Tompkins she used the central peaks and interiors of craters ace to probe global crustal diversity.

One of the most difficult problems in remote sensing of planetary surfaces is the fact that crustal rocks and minerals are altered by weathering processes dissimilar to those known on Earth. Carle Pieters' research has helped to determine the processes responsible for altering materials in the space environment and to measure the effects of these processes on samples. Early work (often in collaboration with John Adams and Tom McCord) centered on regolith formation processes. Later work focused on space weathering processes, particularly on the nature of asteroidal surfaces and evaluating observational and experimental data to identify asteroidal source bodies for diverse meteorite types.

Carle's rigorous analysis of materials and problems on Earth, Mars and Venus is exemplified by her *Science* paper on the color of Venus' surface. This provided basic insight into the nature of Venus and involved a comprehensive analysis of Soviet Venera data, including the sharing of unpublished scientific information from Soviet colleagues. This effort highlights Carle's talents and reputation in international scientific circles, including Europe, Russia and Japan.

Carle is currently Principal Investigator on the Moon Mineralogy Mapper, a NASA Discovery instrument that flew on the Indian Chandrayaan-I Spacecraft; needless to say, the detection of water on the Moon and the documentation of detailed crustal mineralogy has ushered in a new era of exploration and discovery.

Carle, we congratulate you, a truly deserving recipient of the G. K. Gilbert Award! Few can match your levels of scientific accomplishment, intellectual rigor, community service, openness and unselfish cooperation in research.

Response by Carle M. Pieters

Thank you for such kind words. It makes me a bit nervous to hear my life compressed and flying by like that. I hope I can live up to the expectations!

It is impossible to say how deeply moved I am by all the colleagues, family, friends, students, who somehow managed to get me here today as the Gilbert awardee. I am off-scale honored and humbled by this award. Thank you ALL!

In thinking about what to say now, since my comments are to be posted, I thought I'd take a moment to outline a few thoughts that might be worth reading by the younger generation … or what *you* might do to be an Award winner. This might be sub-titled "Leadership in Science: Hindsight from remarkable scientific discoveries."

What makes a good leader? Hard work? Opportunity? Curiosity? Luck? Education? Experience? Commitment? Personality? Wisdom? Certainly all such things are valuable and present at some level in colleagues we acknowledge as leaders, people we entrust to influence the course of the world around us. A position of leadership is not to be confused with actually being a leader. People are put in a position of leadership by appointment, election, or seniority. Some who are in a position of influence turn out to be good leaders, while others are lousy, and a few (hopefully very few) do more harm than good.

In the course of being involved in magnificent discoveries of the last several years in planetary science … I see three requirements that define a good leader. I believe these principles are true for science leadership as well as leadership in many national or international endeavors. For the sciences, progress and good leadership are closely intertwined. The three requirements are simple to state, but not easy to embody *all* together. A good leader must be able to meet not one, not two, but *all* of the following three requirements:

1. Know what is important. These are basic principles, values, edge of knowledge. Many/Most scientists in this room meet this requirement. Nevertheless, this is a *continuous* learning and seeking process.

2. Identify what needs to be done. Develop strategy. Answer what, why, and how? And continually ask. Know the technology to determine what *can* be done. Actively participate in planning committees.

3. Get it done. This is hands-on know-how. Performing jobs, while developing teamwork. It requires perseverance, adjustments and compromise, worry about details and follow through, commitment over and over, and clear thinking to do no harm. Understand constraints of political and budget context. Taking the next step with purpose.

To be a good and knowledgeable scientist is a necessary, but insufficient, requirement for scientific leadership. A good leader has a sense of direction and the ability

to carefully plan the next step. Perhaps the hardest, most demanding, task is moving forward – and all the dedication, good fortune, and support from others that that also involves.

I can't claim to be great at this, but I know previous Gilbert awardee leaders met all three requirements, and I look forward to greeting the *next* Gilbert award winners!